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Implications of World Sugar Markets, Policies, and Production Costs for U.S. Sugar

Frederic L. Hoff
Max Lawrence

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IMPLICATIONS OF WORLD SUGAR MARKETS, POLICIES, AND PRODUCTION COSTS FOR U.S. SUGAR. By Frederic L. Hoff and Max Lawrence. Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 543.

ABSTRACT

Most of the major sugar producing and exporting countries, including the United States, have adopted national policies to protect domestic producers from the periodic price depressions. U.S. sugar production costs are above both current world sugar prices and the prices at which the major cane sugar exporters can operate profitably. Consequently, the U.S. sugar industry cannot now compete in an open domestic sweetener market without upheaval in its production and processing sectors, unless it receives Government assistance on a continuing basis.

Keywords: Sugar, price supports, production costs, policies, sugarcane, sugarbeets, corn sweeteners.

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PREFACE

The Agriculture and Food Act of 1981 mandated a price support program for domestically grown sugarcane and sugarbeets which expires with the 1985 crop. The sugar program in the 1981 Act has been administered by the U.S. Department of Agriculture through a system of import duties, fees, and country-by-country quotas. Although U.S. sugar producers and processors have benefited from the program, an increasing share of the program benefits have flowed to producers of substitute sweeteners. Also, U.S. users and consumers have paid more for sugar than they would have if domestic sugar prices had been allowed to fall in line with world "free" market prices. However, without a sugar program, the domestic sugar industry would be subject to the full force of swings in world sugar prices, which currently are well below the estimated operating costs of domestic sugar producers and processors.

This report examines the structure of the world market for sugar, costs of producing cane and beet sugar in the major sugar countries, national sugar policies, and implications for future sugar legislation. Although the report does not indicate whether the United States should support a sugar industry, particularly when world sugar stocks are abundant and prices are low, it does provide useful information for deliberations on U.S. sugar policy.

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SUMMARY

Sugar prices are among the most volatile in international trade, rising sharply one year and falling abruptly a season or two later. Consequently, most sugar-producing countries have enacted policies to protect their sugar producers and consumers from price instability. Such policies have made the market even more volatile and stimulated production of sugar and substitute sweeteners, further depressing world sugar prices. World sugar prices dropped from 5.2 cents a pound in 1984 to 3.7 cents a pound in the first quarter of 1985. The current low-price trough of the sugar cycle seems longer and lower than most.

The U.S. policy of price supports, mandated by the Agriculture and Food Act of 1981 and protected from foreign competition by a system of import fees, duties, and quotas, has insulated U.S. sugar producers from world price fluctuations. But in doing so, it has supported the production of U.S. beet and cane sugar producers and processors at costs which are well above current world market prices and enhanced the profitability of domestic producers of high-fructose corn syrup, a sugar substitute. As a result, without continuing Government assistance, the U.S. sugar industry would undergo a major structural upheaval if unlimited amounts of foreign sugar could enter the United States at low world prices. Many producers and processors would go out of business, the industry would wither in some regions, and the remaining units would have to adjust their operations to become more cost competitive.

In the long run, the general interest of society would be served best with less international protectionism so that sugar production could be concentrated in those countries that have a comparative advantage. Toward that end, one policy option is for the United States to use its influence to reduce protectionism by all the major sugar producing and exporting nations. Another option is to engage in retaliatory protection by increasing price supports and imposing higher import fees and duties and more restrictive import quotas on sugar.

World Sugar Market Characteristics

World production of centrifugal sugar (refined and semi-refined sugar) increased from 73 million metric tons, raw value, in 1970 to over 100 million in 1982, then declined slightly in 1983 to 97 million metric tons (mmt).

The leading producers of centrifugal sugar (Brazil, Cuba, the Soviet Union, India, the United States, and the 10 nations of the European Community) now supply over half of world sugar production.

World consumption of centrifugal sugar increased from 72 mmt, raw value in 1970 to nearly 93 mmt in 1983. From 75-80 percent of sugar production is generally consumed in the country where it is grown.

Leading consumers of sugar are the Soviet Union, the European Community, the United States, India, Brazil, China, Mexico, and Japan. Those nations account for over 60 percent of world consumption.

The world sugar market consists of the domestic markets, special trade arrangements and bilateral agreements between major importers and their suppliers, and the residual free market.

Total world net exports increased from an annual average of 18.8 mmt, raw value, in 1970-74 to slightly over 25 mmt during the early 1980's. However, only about

80 percent of the world net exports entered the residual market, the remainder being traded under special arrangements.

The four largest exporters--Cuba, the European Community, Brazil, and Australia--accounted for nearly two-thirds of the sugar entering world trade during 1980-83. Of these four, only Australia depended on the free market for disposing of the bulk of its production. The others have large domestic markets or, as in the case of Cuba, trade arrangements involving a large foreign aid component.

Between 1970 and 1983, world net imports of centrifugal sugar rose by a third, from 17.7 to 23.6 mmt, raw value. The share of world sugar imports traded in the free market increased from 77 percent in 1970 to over 81 percent in 1983.

The four major importers--the Soviet Union, the United States, Japan, and China--accounted for nearly half of world sugar imports during 1980-83. The remainder was traded in smaller markets, none of which accounted for more than 1 mmt. The United States is the largest importer of sugar from the free market.

World Costs of Producing Sugar

An analysis of production and processing costs in major trading countries reached the following conclusions (the analysis was conducted by Landell Mills Commodities Studies Ltd., London, England):

In 1982, sugarbeet production and processing costs for 26 producing regions averaged 23.31 cents a pound or over 47 percent higher than the 15.81-cent average for 56 cane-producing countries. France was the only beet producer competitive with the lowest cost cane sugar exporters. U.S. costs of producing high-fructose corn syrup (HFCS) were also well below the cane-sugar average.

The estimated cane sugar production and processing costs for major exporters ranged between 10.73 and 15.32 cents a pound in 1982. U.S. cane sugar production costs in 1982 averaged 21.31 cents a pound on the mainland and 16.76 cents a pound in Hawaii.

Calculated on the same basis, sugarbeet production and processing costs for major exporters ranged between 12.87 and 15.22 cents a pound in 1982. U.S. sugarbeet production costs were estimated at 23.24 cents a pound for 1982.

As a proxy for profits and losses, the national average production costs for sugarcane and sugarbeets were compared with world market prices since 1979. Most countries were able to sell their sugar at a large profit (production costs less than the world price) in 1980 and a smaller profit in 1981. But since 1981, most of the major producing countries sold at a loss (production costs more than the world sugar price). For the least cost producers, the profits from 1980 and 1981 were just about sufficient to offset the losses of the other 4 years. (The least cost producers included the major sugarcane exporters of South Africa, Fiji, South-Central Brazil, Australia, the Dominican Republic, and Cuba, together with U.S. HFCS and the most efficient EC beet sugar producers.) Some of the higher cost beet producers did not cover their production costs on the free market in even the high-price years.

National Sugar Policies

In 1983, nearly two-thirds of world sugar production and over half the consumption took place in just 13 nations that dominate world sugar trade with over three-

fourths of the exports and half of the imports. Each nation intervenes directly in their domestic sweetener market and most regulate both producer and consumer prices.

National policies with the biggest impacts on the international market are those that have included low-cost efficient sectors under price umbrellas intended to shelter high-cost producers. EC price supports were established chiefly to protect Italian producers. Yet, efficient French producers found it profitable to expand output at those prices. As a result, the EC moved from being a net sugar importer in the early 1970's to the world's second largest exporter in the 1980's. High sugar prices in the U.S. domestic market have likewise caused lower cost HFCS producers to expand output to such an extent that U.S. sugar imports are now only half what they were a few years ago. This reduction in U.S. imports is equivalent to around 10 percent of the world trade in sugar.

Large implicit subsidies in the sugar programs of the Eastern Bloc countries have enabled rapid expansion of sugar production, despite production costs double those of potential competitors. However, consumption is increasing at an even faster rate, resulting in growing imports from the free market.

Preferential trading arrangements with subsidized terms have had much the same effect as protective national policies. The main benefactors under these arrangements are major trading countries with highly protective national policies of their own--the Soviet Union, the European Community, and the United States, with its import quotas.

Implications of World Sugar Markets, Policies, and Production Costs for U.S. Sugar

Frederic L. Hoff
Max Lawrence

INTRODUCTION

Centrifugal sugar, the refined or semi-refined product of sugarcane or sugarbeets, is the most important sweetener in the world and dominates sweetener trade. In 1982, centrifugal sugar made up about 82 percent of the estimated 112.5 million metric tons (mmt) of sweeteners consumed throughout the world (2). ^{1/} Noncentrifugal sugar, a product made and consumed primarily in Asia by concentrating sugarcane juice and crystallizing the sugar in it without removing any of the molasses, accounted for about 7 percent of world sweetener consumption. Starch-based sweeteners, produced primarily from corn, and low-calorie sweeteners accounted for about 9 percent and 2 percent of consumption, respectively.

Sugar is traded by more than 160 countries in one of the most volatile of international commodity markets. Consequently, most major sugar-producing countries have enacted policies to protect their producers and consumers from price swings. As a result, production and consumption of sugar is less responsive to price changes, world market price swings are more extreme, and world sugar stocks are significantly higher than they would otherwise be.

This report examines the structure of the world market for centrifugal sugar, including trends in world production, consumption, prices, and trade. It analyzes production costs of 56 sugarcane producing countries and 26 sugarbeet producing countries to determine the conditions under which total world sugar production has expanded since 1981, despite low prices. The national sugar policies of major countries producing and exporting sugar are studied to identify incentives for expanding sugar production. The characteristics of the world sugar market, production costs, and sugar policies have important implications for U.S. sugar legislation.

STRUCTURE OF THE WORLD SUGAR MARKET

The volatility of the world sugar market arises from three main factors. First, both demand and supply of sugar have traditionally been largely insensitive to movements in the price of sugar (that is, price inelastic). This means that sometimes quite large price movements are necessary to clear the market of tem-

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^{1/} Underscored numbers in parentheses refer to sources in the References Section.

porary surpluses or deficits. Second, the market is a residual one: over 70 percent of the sugar is consumed in the country of production. Finally, most major producing/consuming countries have protective policies to insulate their domestic sugar industries from international market forces. This means that most of the adjustments necessary to clear the market at the global level get transmitted to the small portion of the market that is freely traded.

Three factors should act to reduce the volatility of world prices. First, sugar substitutes are becoming more important, especially in the U.S. market. The availability of substitutes like high-fructose corn syrup (HFCS) and aspartame makes users more sensitive to the price of sugar (that is, it increases the elasticity of demand for sugar). Second, alternative uses are being found for sugarcane, the most notable example being the Brazilian Alcohol Program. This makes the supply of sugar in the world market more responsive (elastic) to price changes. Third, a greater proportion of the sugar production in some countries is now coming from sugarbeets, which being an annual crop, unlike sugarcane, allows producers to adjust supply more rapidly in response to price changes.

Countering these factors, increased protectionism has depressed sugar prices and destabilized the market. Support policies in the European Community (EC) stimulated sugar production so that, a net importer prior to 1977, the EC is now second only to Cuba as an exporter. In the United States, restrictive import quotas enacted in 1982 to defend the price support program mandated by the Agriculture and Food Act of 1981 led to a halving of imports by the second largest sugar importer in the world. The reduction in imports was due, not to expansion of domestic sugar production (as in the EC), but to inroads by HFCS under the price umbrella established for sugar by the domestic price support program.

In addition, other major sugar-producing countries continue to support high-cost domestic sugar industries, despite the low prices and huge supplies in the world market. The most notable examples of this are the centrally planned economies of the Soviet Union, Eastern Europe, and Japan. Brazil, a leading exporter, has used government regulations and credit subsidies to foster expansion of its sugarcane production base in line with the objectives of its fuel alcohol program.

The remainder of this section discusses world sugar production, consumption, and trade by major country or region and price patterns in the world market.

Production

Sugar is produced and traded throughout the world because it can be derived from both sugarcane, a tropical crop, and sugarbeets, a semitropical and temperate crop. About 125 countries produce sugarbeets or sugarcane. Due to the close correspondence between climate and economic development, cane sugar is the major sugar crop produced in developing countries and beet sugar is the product of the developed countries. About 60 percent of the world production of centrifugal sugar is produced from sugarcane. Historically, the developed countries have received most of their sugar imports from the less developed tropical nations.

Since 1970, world centrifugal sugar production increased from 73 mmt, raw value, to over 100 mmt in 1982 (table 1). From 1970-1975, world production rose at an average annual rate of 2.4 percent. That growth slowed considerably between 1975 and 1980 to under 1 percent. Fueled by high prices in 1980-81, world sugar production increased over 19 percent from 1980-82. In 1983, world sugar production dropped slightly to 96.8 mmt.

The leading producers of centrifugal sugar are Brazil, Cuba, the Soviet Union, India, and the United States. However, the 10 nations of the European Community produced 60 percent more sugar than any single nation over the 1980-83 period. The EC now accounts for over half of world sugar production (table 2). The major expansion in sugar production since the early 1970's occurred in the EC, Brazil, and India (app. table 1). The rapid expansion of domestic production in the EC resulted from policies geared toward self-sufficiency. In Brazil and India, increased domestic and foreign demand are the major factors behind expansion of domestic sugar production.

Consumption

Many of the large world sugar producers are also large consumers of sugar. Typically, 75-80 percent of world sugar production is consumed in the country where it is grown. Leading consumers of sugar are the Soviet Union, the European Community, the United States, India, Brazil, China, Mexico, and Japan, which together account for over 60 percent of world consumption (table 3).

World consumption of centrifugal sugar increased from 72.1 mmt in 1970 to nearly 93 mmt in 1983, which represented average annual growth of slightly over 2 percent (app. table 2). The growth rate varied significantly between countries, however. In the developing countries, per capita consumption nearly doubled between 1960 and 1983 (table 4). Although still quite low at 15 kilograms per capita in 1983, this growth, combined with a rapid population growth, significantly increased the developing countries' share of world sugar consumption to 50 percent.

Table 1—World sugar production, consumption, and trade

	Production					Trade	
Calendar year	Consumption			Ending stocks	Net exports	Free market exports 1/	
	Cane sugar	Beet sugar	Total				
Million metric tons, raw value							
1970	43.6	29.3	72.9	72.1	NA	18.1	13.9
1971	43.0	30.9	73.9	74.4	NA	17.4	14.4
1972	43.4	32.3	75.7	75.8	NA	19.0	16.6
1973	45.8	32.0	77.8	78.5	NA	19.5	16.5
1974	48.9	30.0	78.9	80.1	NA	19.9	16.1
1975	49.6	32.0	81.6	77.1	NA	18.4	13.2
1976	51.2	31.2	82.4	79.2	34.3	20.0	15.5
1977	54.6	35.7	90.3	82.6	40.6	25.4	20.7
1978	55.0	35.8	90.8	86.2	44.7	22.4	17.5
1979	54.8	34.5	89.3	90.0	43.0	23.4	18.3
1980	51.5	33.0	84.5	88.2	39.3	23.1	19.4
1981	56.9	35.7	92.6	88.8	41.1	25.1	20.5
1982	63.6	37.1	100.7	91.9	48.8	27.3	21.6
1983	61.0	35.8	96.8	92.6	52.2	25.3	20.5

NA denotes not available.

1/ The total of each country's net exports less any net exports under special arrangements.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

The socialist countries have also experienced continued growth in consumption of sugar. Per capita consumption in these countries was the highest in the world in 1983 at 48 kilograms. Although the absolute increase in per capita consumption in the socialist countries since 1960 is comparable with that experienced by the developing countries, the rate of growth in per capita consumption is much smaller in the socialist countries as a result of their high consumption levels.

Conversely, sugar consumption per capita in the developed countries has been declining since the mid-1970's in response to competition from HFCS, low-calorie products, synthetic sweeteners, and the generally high sugar prices caused by protective policies. Consequently, due to the offsetting trends between the developed and other countries of the world, per capita world sugar consumption has increased only 10 percent since 1960.

Trade

The "world sugar market" actually encompasses three different markets (10). First, are the domestic markets of each sugar-producing country. Second, there

Table 2—Average production and share of world production of centrifugal sugar, by country or region

Country or region	Average production			Share of world production		
	1970-74	1975-79	1980-83	1970-74	1975-79	1980-83
	: Million metric tons, r.v.			: Percent		
European Community	9.7	12.3	14.3	12.8	14.2	15.2
Soviet Union	9.0	8.2	7.4	11.9	9.5	7.8
Other Europe	7.1	8.4	9.1	9.3	9.6	9.7
Brazil	6.0	7.5	8.9	8.0	8.7	9.5
Other South America	4.5	5.0	5.0	6.0	5.8	5.3
India	4.2	5.6	7.0	5.5	6.5	7.5
China	3.3	2.6	3.5	4.3	3.0	3.8
Japan	0.4	0.5	0.8	0.5	0.6	0.9
Philippines	2.2	2.6	2.4	2.9	3.0	2.5
Thailand	0.7	1.8	2.2	0.9	2.1	2.3
Other Asia	3.2	3.7	3.6	4.3	4.2	3.9
Cuba	5.9	7.0	7.6	7.8	8.1	8.1
Mexico	2.6	2.9	2.8	3.5	3.3	3.0
Other Central America	3.1	3.5	3.4	4.1	4.0	3.6
United States 1/	5.5	5.7	5.4	7.3	6.6	5.8
Other North America	0.1	0.1	0.1	0.1	0.1	0.1
Australia	2.7	3.2	3.5	3.6	3.6	3.7
Other Oceania	0.4	0.3	0.4	0.5	0.4	0.5
Africa	5.1	5.9	6.5	6.8	6.7	6.9
World total	75.8	86.9	93.7	100.0	100.0	100.0

1/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

are special trade arrangements and bilateral agreements between some of the major importers and their suppliers. Finally, there is a residual "free market" for sugar that does not receive preferential treatment. However, this market has from time to time been regulated by international sugar agreements which have attempted to stabilize the world sugar price.

The patterns of trade in the world sugar market have changed significantly over the last decade. In 1970, over half of the sugar entering the world market was traded among six countries. World exports were dominated by Cuba, Australia, and Brazil, while the United States, Japan, and the Soviet Union dominated the world imports. The EC was a net importer in 1970 with about a 5.6-percent market share (figs. 1 and 2).

By 1983, the United States and Japan had sharply reduced their dependence on sugar imports while the Soviet Union had surpassed the United States as the leading importer by increasing its market share of imports from 8.5 to 25 percent. Also, the EC became the second largest exporter, behind Cuba, by rapidly expanding its sugar production in the late 1970's and early 1980's. In addition, China became a major sugar importer.

Table 3—Average consumption and share of world consumption of centrifugal sugar, by country or region

Country or region	Average consumption			Share of world consumption		
	1970-74	1975-79	1980-83	1970-74	1975-79	1980-83
	: Million metric tons, r.v.			: Percent		
European Community	10.9	10.5	10.7	14.3	12.6	11.8
Soviet Union	10.8	11.8	12.6	14.2	14.2	13.9
Other Europe	8.7	9.4	9.8	11.4	11.4	10.8
Brazil	4.1	5.3	6.1	5.3	6.4	6.7
Other South America	3.5	4.0	4.4	4.5	4.9	4.8
India	3.9	4.8	6.1	5.2	5.8	6.7
China	3.6	3.4	4.6	4.8	4.1	5.1
Japan	3.2	3.1	2.9	4.2	3.7	3.2
Philippines	0.7	1.0	1.2	1.0	1.2	1.3
Thailand	0.4	0.6	0.6	0.6	0.7	0.7
Other Asia	5.6	6.8	8.3	7.4	8.2	9.2
Cuba	0.5	0.5	0.6	0.7	0.6	0.7
Mexico	2.1	2.8	3.3	2.8	3.3	3.7
Other Central America	0.9	1.2	1.4	1.2	1.4	1.5
United States 1/	10.5	9.9	8.7	13.7	11.9	9.7
Other North America	1.1	1.1	1.0	1.4	1.3	1.1
Australia	0.7	0.8	0.8	1.0	1.0	0.9
Other Oceania	0.2	0.2	0.2	0.3	0.2	0.2
Africa	4.6	5.9	7.4	6.1	7.1	8.2
World total	76.2	83.0	90.4	100.0	100.0	100.0

1/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Exports

Total world net exports of sugar increased from an average of 18.8 mmt, raw value, for 1970-74 to slightly over 25 mmt during the early 1980's (table 5). However, only about 80 percent of these world net exports entered the residual free market as defined by the International Sugar Organization (ISO). For example, of the total net exports in 1982 of 27.3 mmt, only 21.6 mmt entered the residual free market (app. table 4). The difference, 5.7 mmt, comprised shipments by Cuba under special arrangements with Eastern bloc countries. In addition, 1.3 mmt of sugar were shipped to the EC by African, Caribbean, and Pacific (ACP) countries that are signatories to the Lome Convention, but was offset by equivalent increases in EC shipments to the residual free market.

The four largest exporters--Cuba, EC, Brazil, Australia--accounted for nearly two-thirds of the sugar entering world trade during 1980-83. Australia depends most on the residual market, with almost three-fourths of its production over 1980-83 destined for that market (table 6). Cuba is the main beneficiary of special trading arrangements. While it exports over 90 percent of its crop, Cuba sells only about a fourth of its production on the residual free market. Although the EC consumes about three-fourths of its sugar production, it is by far the largest single exporter to the residual free market. During 1980-83, the EC exported an average of 5 mmt of sugar to the residual free market annually, nearly a fourth of that market's supply. Next were Brazil and Australia, with exports to the free market of around 2.5 mmt each, and Cuba, with 2 mmt.

In reporting world net exports of sugar to the residual free market, the ISO includes certain trade that occurs under arrangements similar to those applying to Cuba and the ACP countries. Therefore, it gives an inflated measure of the market in which sugar is traded freely. The main category of such trade is the 2.4 mmt exported to the United States by holders of U.S. import quotas at prices equivalent to the supported U.S. domestic price (less applicable fees and

Table 4--Distribution and per capita world sugar consumption, selected years

Year	Developing countries		Socialist countries		Developed countries		World
	Share	Per capita	Share	Per capita	Share	Per capita	Per capita
	Percent	Kg	Percent	Kg	Percent	--- Kg ---	
1960	33	8	22	39	45	36	19
1965	34	9	20	38	45	38	18
1970	37	10	20	43	44	41	20
1975	41	11	20	44	38	37	19
1980	47	13	19	46	35	38	20
1981	48	13	19	46	34	37	20
1983	50	15	20	48	30	36	21

Source: Table developed by Economic Perspectives, Inc., McLean, Va., from data published by F.O. Licht and World Sugar Journal.

Figure 1

Market share of net sugar exports, 1970 and 1983

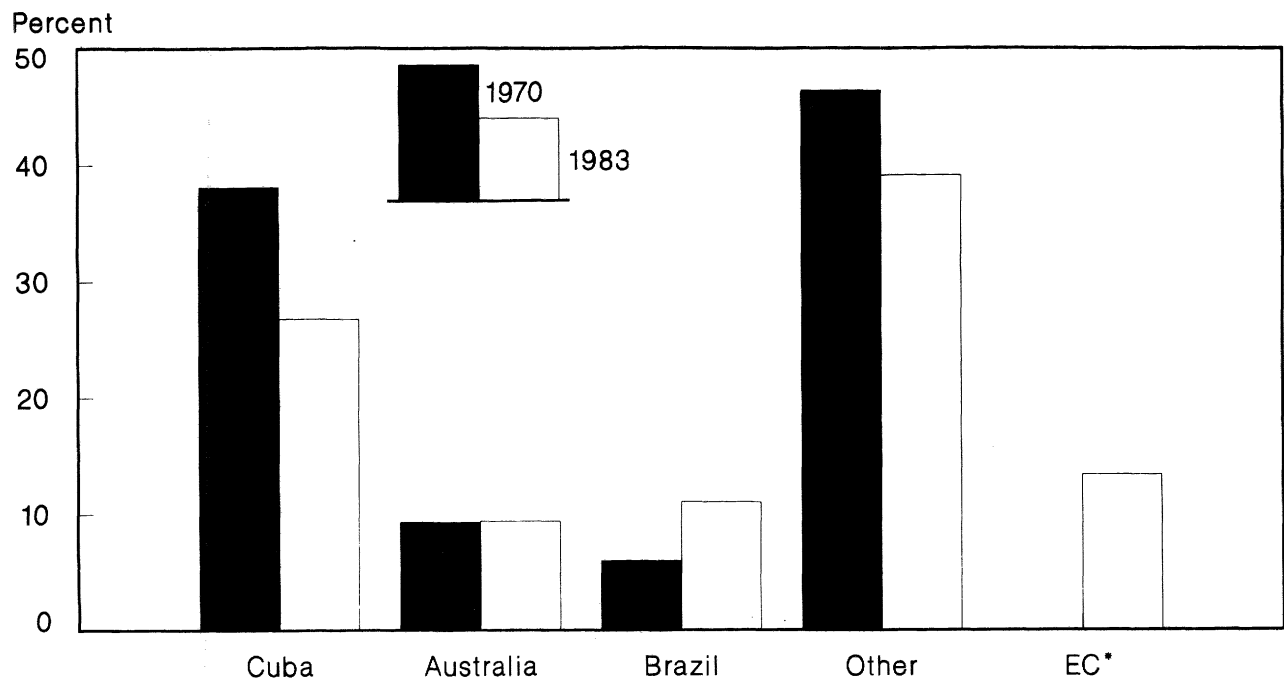
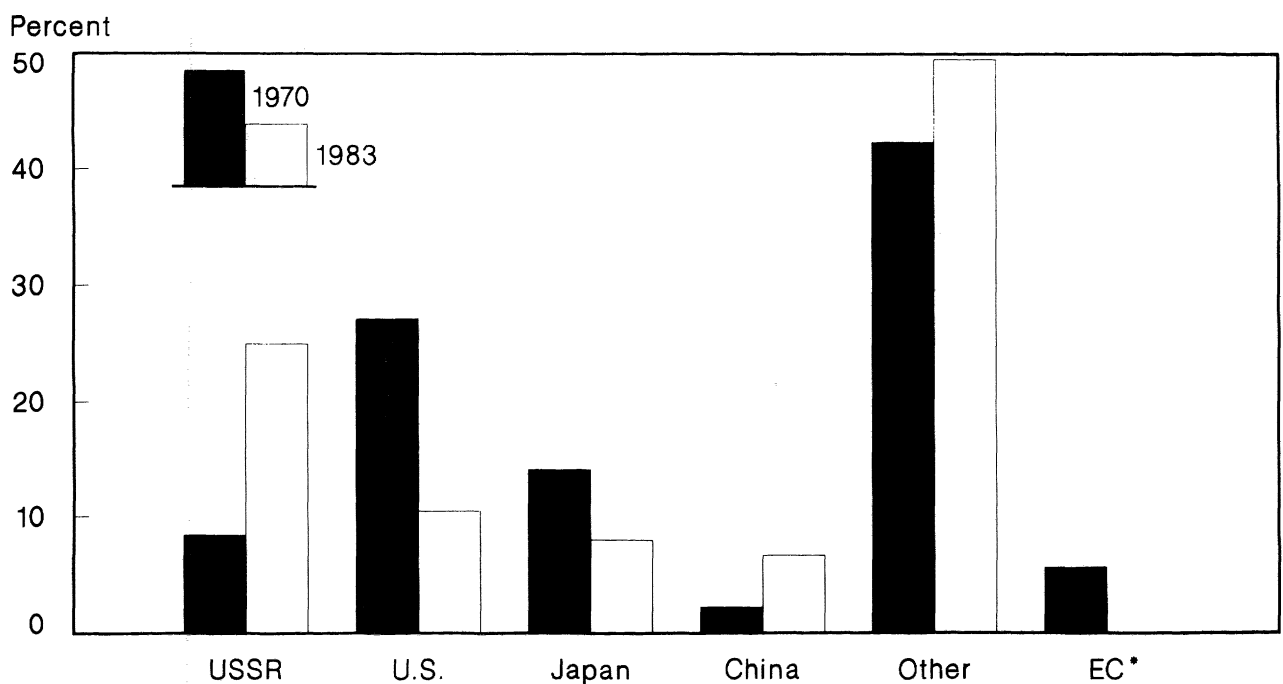


Figure 2

Market share of net sugar imports, 1970 and 1983



duties). When free market exports are adjusted for the exports to the United States under quota, exports to the residual free market totaled 19.2 mmt in 1982, equivalent to 19 percent of world production and 70 percent of total net exports.

However, the true residual free market where sugar is traded on a day-to-day basis at quoted world prices is smaller even than this. Some sugar is traded under long-term contracts whose pricing provisions protect both buyer and seller against extreme short-term price shifts. Also, some transactions are influenced by the relative marketing power or negotiating skill of the participants, or by deficiencies in market information. Despite these considerations, the residual market remains the main source of income for some of the leading cane sugar-exporting countries. In 1982, Australia sold 64 percent of its sugar in this market, Thailand 58 percent, and the Philippines 41 percent.

Imports

Between 1970 and 1983, world net imports of centrifugal sugar increased a third from 17.7 to 23.6 mmt, raw value (app. table 5). During the same period, world

Table 5—Average world net exports and share of net exports of centrifugal sugar, by country or region

Country or region	Average net exports			Share of world net exports		
	1970-74	1975-79	1980-83	1970-74	1975-79	1980-83
	: Million metric tons, r.v.			: Percent		
European Community	N.I.	1.0	3.6	N.I.	4.6	14.4
Soviet Union	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other Europe	0.4	0.4	0.5	2.1	2.0	1.9
Brazil	2.0	1.9	2.8	10.9	8.5	10.9
Other South America	1.4	1.3	1.2	7.3	6.0	4.7
India	0.3	0.7	0.3	1.6	3.3	1.3
China	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Japan	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Philippines	1.4	1.5	1.4	7.5	6.8	5.4
Thailand	0.3	1.1	1.2	1.5	5.2	4.8
Other Asia	0.5	0.5	0.4	2.9	2.2	1.4
Cuba	5.4	6.4	6.9	28.5	29.4	27.5
Mexico	0.6	1/	N.I.	3.1	0.2	N.I.
Other Central America	2.1	2.3	1.9	11.4	10.5	7.6
United States 2/	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other North America	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Australia	1.9	2.3	2.6	10.3	10.6	10.2
Other Oceania	0.3	0.3	0.4	1.6	1.4	1.6
Africa	2.1	2.1	2.1	11.3	9.5	8.4
World total	18.8	21.9	25.2	100.0	100.0	100.0

N.I. denotes net importer.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

net imports from the free market (as defined by the ISO) increased by over 40 percent, from 13.6 mmt to 19.2 mmt (app. table 6). The share of world sugar imports traded in the free market rose from 77 percent in 1970 to over 81 percent in 1983.

The four major sugar importers--the Soviet Union, the United States, Japan, and China--collectively accounted for nearly half of world sugar imports during 1980-83 (table 7). The remainder of the sugar was traded in smaller markets, none of which accounted for more than 1 mmt. Besides being the biggest importers, the Soviet Union, the United States, and China are also among the largest sugar producers in the world, accounting for 19 percent of world sugar output in 1983. These three countries also account for the bulk of sugar imported under special arrangements, the only other special arrangements being those covering some Cuban sugar entering other Eastern bloc countries and African, Caribbean, and Pacific sugar entering the EC. The United States is the largest importer of sugar from the free market (table 8).

Table 6--Average world net exports and share of net exports of centrifugal sugar to the free market, by country or region

Country or region	Average net exports			Share of world net exports		
	1970-74	1975-79	1980-83	1970-74	1975-79	1980-83
	: Million metric tons, r.v.			- - - - - Percent - - - - -		
European Community	0.4	2.1	5.0	2.5	12.1	24.1
Soviet Union	0.5	N.I.	N.I.	3.0	N.I.	N.I.
Other Europe	0.8	0.6	0.8	5.4	3.5	3.8
Brazil	2.0	1.9	2.8	13.0	10.9	13.4
Other South America	1.2	1.1	1.0	7.6	6.7	4.9
India	0.3	0.7	0.3	1.8	4.1	1.6
China	0.0	N.I.	N.I.	0.1	N.I.	N.I.
Japan	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Philippines	1.4	1.5	1.4	9.0	8.7	6.6
Thailand	0.3	1.1	1.2	1.8	6.7	5.9
Other Asia	0.5	0.5	0.4	3.5	2.8	1.7
Cuba	2.0	1.8	2.0	13.0	10.3	9.5
Mexico	0.6	1/	N.I.	3.7	0.2	N.I.
Other Central America	1.8	1.9	1.7	11.5	11.4	8.2
United States 2/	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other North America	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Australia	1.9	2.3	2.6	12.5	13.6	12.6
Other Oceania	0.2	0.1	0.3	1.3	0.7	1.2
Africa	1.6	1.4	1.4	10.2	8.2	6.6
World total	15.5	17.0	20.5	100.0	100.0	100.0

N.I. denotes net importer.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Raw Sugar Prices

The world price of raw sugar generally follows a pattern of high prices for 1 or 2 years followed by a long period of low prices. World sugar price "spikes" have occurred five times since 1950: during 1950-51, 1957, 1963-64, 1974-75, and 1980-81 (fig. 3).

The average annual world raw sugar price (f.o.b. Caribbean, Contract No. 11) increased from 3.75 cents a pound in 1970 to 30 cents in 1974, then declined through 1978 as production outpaced consumption and the ratio of stocks to consumption rose. In 1979, the average world price moved up slightly as production declined. During 1980, world output fell sharply due to bad weather in the Soviet Union, India, and Thailand, crop disease in Cuba, and reduced sugarcane acreage in Brazil. With the accompanying depletion of sugar stocks, the world price rose to 42 cents a pound in October 1980. Since 1981, world sugar stocks have increased to record levels with the result that the world price has dropped to pre-1970 levels. The world raw sugar price averaged 5.18 cents a pound in 1984 and has since dropped to 3.68 cents for the first quarter of 1985.

Table 7—Average world net imports and share of net imports of centrifugal sugar, by country or region

Country or region	Average net imports			Share of world net imports		
	1970-74	1975-79	1980-83	1970-74	1975-79	1980-83
	: Million metric tons, r.v.			: Percent		
European Community	0.7	0.3	N.E.	4.0	1.5	N.E.
Soviet Union	1.6	3.8	5.7	8.5	18.1	23.5
Other Europe	2.1	1.7	1.6	11.3	8.0	6.6
Brazil	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other South America	0.2	0.4	0.8	1.2	2.1	3.1
India	N.E.	N.E.	0.1	N.E.	N.E.	0.2
China	0.5	0.9	1.4	2.5	4.1	5.9
Japan	2.6	2.6	2.0	13.9	12.1	8.2
Philippines	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Thailand	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other Asia	3.0	3.8	4.9	16.3	17.8	20.1
Cuba	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Mexico	N.E.	N.E.	0.7	N.E.	N.E.	2.9
Other Central America	1/	1/	0.1	0.1	0.1	0.2
United States 2/	5.0	4.3	2.9	27.0	20.2	12.0
Other North America	1.0	1.0	0.9	5.2	4.6	3.5
Australia	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other Oceania	0.2	0.2	0.2	1.1	0.9	0.8
Africa	1.7	2.2	3.2	8.9	10.5	13.1
World total	18.4	21.2	24.3	100.0	100.0	100.0

N.E. denotes net exporter.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Instability of the world sugar market is rooted in the basic characteristics of the supply and demand for sugar. Increases in production capacity during the high-price phases of the sugar cycle take several seasons to be absorbed by relatively steady, but slow, growth in total consumption. Processing facilities are expensive to construct and must be of large size to capture scale economies. Consequently, there is a strong incentive for processing plants to be fully utilized once operational, to spread out fixed costs.

World sugar production typically catches up with processing capacity after 5-10 years of low prices and slow growth in consumption. At this point, a disruption to production triggers an explosive price rise and the sugar cycle begins anew. The inability of sugar producers to adjust production rapidly in response to changing economic conditions is another source of instability in world raw sugar prices. Beet sugar production can be increased fairly rapidly during periods

Table 8—Average world net imports and share of net imports of centrifugal sugar from the free market, by country or region

Country or region	Average net imports			Share of world net imports		
	1970-74	1975-79	1980-83	1970-74	1975-79	1980-83
	: Million metric tons, r.v.			: Percent		
European Community	: N.E.	1/	N.E.	N.E.	0.1	N.E.
Soviet Union	: 0.3	0.4	2.5	2.0	2.7	12.6
Other Europe	: 1.5	1.2	1.1	9.7	7.4	5.3
Brazil	: N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other South America	: 0.2	0.4	0.7	1.4	2.7	3.7
India	: N.E.	N.E.	0.1	N.E.	N.E.	0.4
China	: 0.1	0.5	0.9	0.8	3.3	4.3
Japan	: 2.6	2.6	2.0	17.1	15.5	10.1
Philippines	: N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Thailand	: N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other Asia	: 2.8	3.6	4.7	18.1	21.8	23.6
Cuba	: N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Mexico	: N.E.	N.E.	0.7	N.E.	N.E.	3.4
Other Central America	: 1/	1/	0.1	0.1	0.1	0.6
United States 2/	: 4.9	4.3	2.9	32.3	25.9	14.8
Other North America	: 1.0	1.0	0.9	6.3	5.9	4.3
Australia	: N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other Oceania	: 0.2	0.2	0.2	1.3	1.2	1.0
Africa	: 1.7	2.2	3.2	10.9	13.5	16.0
World total	: 15.2	16.5	19.8	100.0	100.0	100.0

N.E. denotes net exporter.

1/ Less than 100,000 metric tons, raw value.

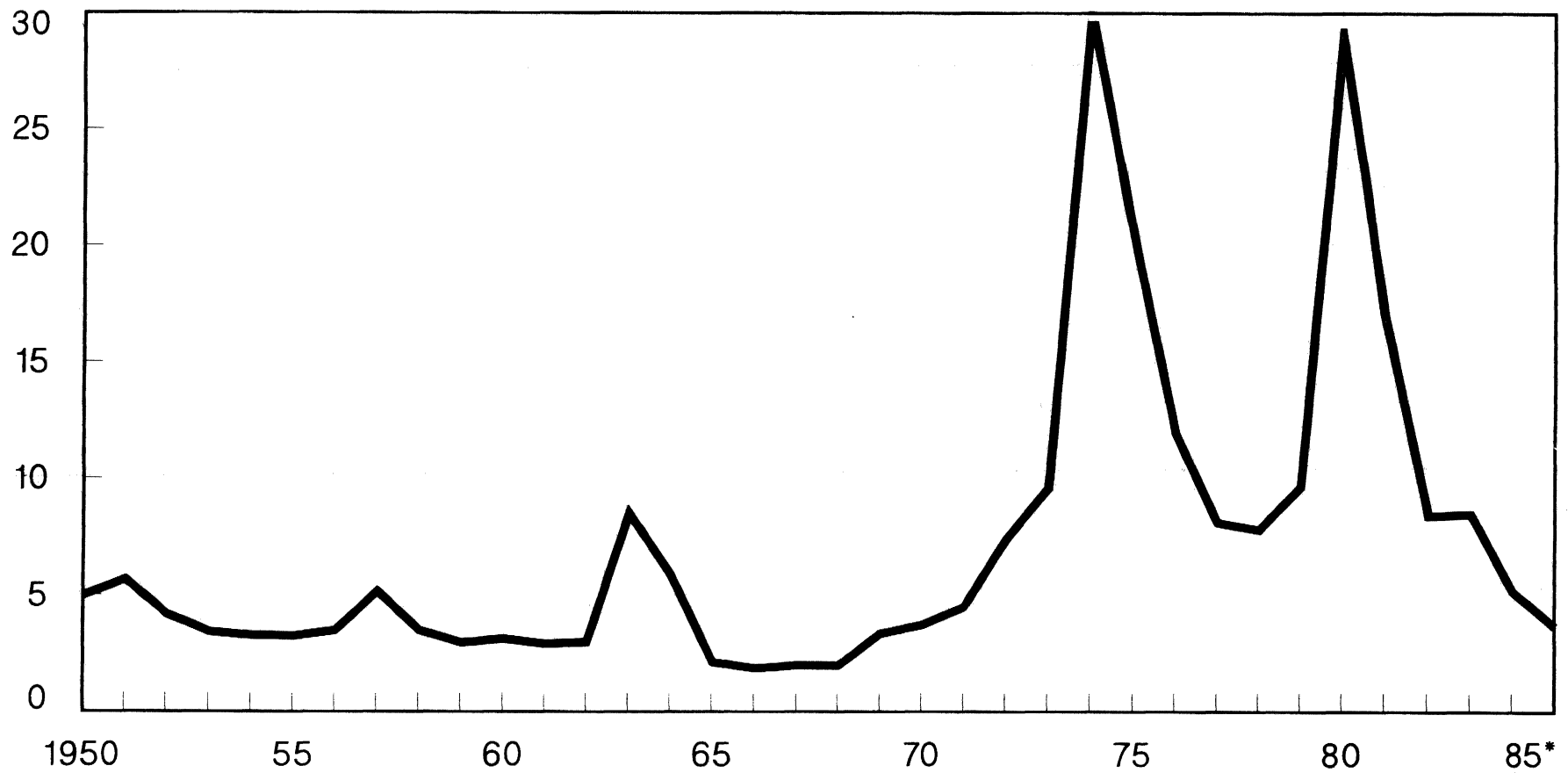
2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Figure 3

Average world raw sugar prices, 1950-85

Cents per pound



* 1st quarter 1985.

when the world price is rising, since the delay between planting and harvesting is about 8 months. However, a 2-year wait may be required before a new crop of sugarcane is ready to be harvested. Therefore, shortrun shortages of raw sugar cannot be quickly alleviated by increased plantings of sugarcane.

PRODUCTION COSTS OF MAJOR SUGAR-PRODUCING COUNTRIES

Measures of production costs are useful because they improve one's ability to forecast likely supply responses to changes in price levels, assist legislators in gauging the likely cost effectiveness of measures designed to make producers more competitive in international trade, provide information on the incidence and severity of impacts of extended low prices on producers, and provide market participants with information relevant to price negotiations.

Key results from an analysis by Landell Mills Commodities Studies Ltd. (LMC) of production and processing costs in major trading countries are presented in this Section (5,6). ^{2/} The production and processing costs cover the period 1979-82 for all major beet- and cane-producing regions of the world, as well as for high-fructose corn syrup in most countries where it is produced.

To the extent that estimated production costs in many cases exceed prices at which sugar is traded in the free market, the LMC study also provides a useful indication of the extent and distribution of subsidies to producers through national farm policies. However, because profits (whether due to efficiency or subsidy) tend to become capitalized into the value of land and other specialized inputs (thereby raising the cost of those inputs), comparisons of costs between different groups of producers need to be approached with care.

Two further limitations also apply. First, since the production cost estimates do not distinguish between fixed and variable costs, they can only indicate likely supply responses in the long run. In the short run, sugarcane producers will maintain output as long as prices cover the variable costs of harvesting, transporting, and processing cane. Because sugarbeets are an annual crop, beet producers can respond more quickly to changes in profitability. Second, the estimates do not provide information on the distribution of costs among individual producers in particular countries since they are aggregated at the country level. Thus, production response to price changes is likely to be greater in countries where there is a wide difference in production costs between high-cost and low-cost producers.

The overall cost estimates developed by Landell Mills Commodities Studies Ltd. for sugarcane and sugarbeets were computed separately for three distinct stages of production and processing. For sugarcane, the first stage was field costs, which covered the initial land preparation before cane planting to the final delivery of the cut cane to the mill. Thus, the costs of cane transportation were included within the field costs. Factory operation was the second stage of production for which costs were estimated. This stage covered everything from the initial arrival of the cane at the mill to the delivery of raw sugar into bulk storage at the mill. The byproduct credits from cane processing are all included entirely within the factory operations. Administrative and overhead management expense, which was assumed to range from 15-25 percent of the combined field and factory costs, was the final item for which a cost was given separately.

^{2/} The study is copyrighted and the results for specific countries may not be quoted or published without the prior approval of LMC. LMC has consented to the reporting of aggregate results for particular countries and groups of countries.

Sugarbeet production costs were divided into similar categories. The field costs covered production from seed planting through delivery of the sugarbeets to the processing plant. Factory costs then carried on the production process to the delivery of refined white sugar into storage at the factory. All byproduct credits from sugarbeet production were attributed to the factory operation. Like sugarcane, the administrative and management overhead costs were added to the field and factory components to arrive at the estimated total production and processing costs. Finally, the beet sugar costs were converted into raw sugar equivalents to give a measure the relative competitiveness of beet and cane sugar producers.

The analysis of the costs incurred to manufacture high-fructose corn syrup (HFCS) involved just two main categories of costs. The first included costs related to the net raw material inputs of corn, from which the value of corn gluten and corn oil byproducts was subtracted. The second category of costs was related to the processing of starch into HFCS.

Study Results

The main results of the study are summarized in table 9. The most notable result is the wide disparity between the average cost of producing cane sugar and beet sugar. In 1982, beet sugar production and processing costs averaged 23.31 cents a pound, 47 percent higher than the 15.81-cent average for cane sugar-producing countries. Also, U.S. costs of producing HFCS were well below the cane-sugar average, but HFCS costs in most other countries were near the higher beet sugar costs.

For most countries, sugarbeets are much more expensive than sugarcane as a source of sucrose. LMC attributes this apparent production cost advantage of cane sugar to four factors:

1. Beet factories rely on purchased supplies of fossil fuels for energy, whereas cane sugar mills, by utilizing bagasse (crushed sugarcane, obtained from sugar making, used as a fuel), tend to be energy self-sufficient;
2. Sugarbeets tend to be grown on land that may also be used for other temperate crops or for nonagricultural purposes. Consequently, the cost of that land largely reflects its potential profitability in uses other than sugarbeets;
3. Labor costs in most sugarbeet-producing countries are much higher than those in most sugarcane-producing countries; and
4. The sugarbeet harvest generally is much shorter than that for sugarcane, with the result that beet factories are much less fully utilized than most sugarcane mills.

As well as being lower, costs of sugarcane producers generally were also more tightly clustered around the mean than was true for beet producers. For beet producers, production and processing costs in 1982 ranged from barely 13 cents a pound, competitive with many cane sugar exporting countries, to nearly 39 cents for the Soviet Union. South Africa, the low-cost producer of the major sugarcane-producing countries, had unit costs of just under 11 cents a pound in 1982.

Because the estimates are presented in terms of U.S. currency, movements in the value of the dollar have obviously been important in determining apparent movements in production costs over the 4 years surveyed. This is particularly noticeable

in the case of the European sugarbeet producers who experienced consistent devaluation of their currencies against the U.S. dollar. Most countries also recorded marked reductions in their cost estimates during 1980-82. As a result of these currency movements, European producers have become much more competitive with U.S. sugar producers, and to a lesser extent, with most other cane sugar exporters. Currency movements notwithstanding, however, part of the reductions observed must be due to productivity gains and adoption of new technology.

Cane Sugar Production Costs

Within the 56 sugarcane-producing countries, four factors are crucial in determining a region's place in the overall ranking of production costs:

Table 9—Estimated production and processing costs, cane sugar, beet sugar, and high-fructose corn syrup, 1979-82

Region and crop	:	1979	:	1980	:	1981	:	1982
<hr/>								
	:	Cents per pound 1/						
Cane sugar	:							
	:							
Major exporters 2/	:	9.46 to 14.63	:	9.76 to 23.48	:	11.61 to 16.19	:	10.73 to 15.32
United States	:							
Mainland	:	17.97	:	19.53	:	21.26	:	21.31
Hawaii	:	13.63	:	13.46	:	15.17	:	16.76
Average 3/	:	13.64	:	15.90	:	15.74	:	15.81
	:							
Beet sugar	:							
	:							
Major exporters 4/	:	12.92 to 18.92	:	15.96 to 22.48	:	13.20 to 21.61	:	12.87 to 15.22
United States	:	17.85	:	19.28	:	23.11	:	23.24
Average 5/	:	22.81	:	26.37	:	24.92	:	23.31
	:							
HFCS 6/	:							
	:							
Major producers 7/	:	10.87 to 37.13	:	13.62 to 31.21	:	13.85 to 32.12	:	11.88 to 34.93
United States	:	11.26	:	12.91	:	13.88	:	12.24
Average 8/	:	21.75	:	23.43	:	22.21	:	21.05

1/ Measured in current U.S. cents per pound of raw sugar equivalent.

2/ Cuba, Brazil (Central-South), Australia, Dominican Republic, India, Philippines, Thailand, South Africa, and Fiji.

3/ Average of 56 sugarcane-producing countries.

4/ France, West Germany, United Kingdom, Netherlands, and Turkey.

5/ Average of 26 sugarbeet-producing countries.

6/ Cents per pound, dry weight, of 42-percent HFCS.

7/ Japan, Canada, Argentina, Spain, Belgium, France, West Germany, Italy, Netherlands, United Kingdom, and South Korea.

8/ Average of 12 HFCS-producing countries.

Source: Copyright by Landell Mills Commodities Studies. London, England. 1981 and 1983.

1. The yield of cane and sucrose per unit of area (most important);
2. The wage rates paid to field labor (100 percent variation between the lowest and highest cost areas);
3. The level of mechanization; and
4. The length of the harvest season and the extent to which mill capacity is utilized.

South Africa and neighboring countries were consistently among the lowest cost producers during 1979-82, performing well on each of the four criteria. Fiji and most states in south central Brazil were also consistently in the top group, reflecting good yields, low wage rates, and an efficient processing sector. These countries were closely followed by Australia, which has generally been successful in offsetting the effect of very high wage rates by developing high-yielding varieties of sugarcane and a very efficient mechanized system of production and processing.

In the Caribbean, only the Dominican Republic and Cuba have maintained their cane sugar production costs below the overall average for the regions studied. The other Caribbean countries have had their costs inflated by the effect of profitable Lome quotas on input prices (notably land), or by the effect of declining cane production on the operating efficiency of processing plants.

In Asia, the main producing countries have also been able to produce sugarcane at below the overall average world cost in most years. However, countries with high yields, such as India and Taiwan, generally had very small plots and intense labor inputs, which largely negated the benefits of high yields. Conversely, countries with a more extensive farming operation such as Thailand and the Philippines, generally had much lower yields.

The major group of cane sugar producers with costs in excess of the 1982 overall mean of 15.81 cents a pound comprised most of north-northeastern Brazil, the United States, and a sizable number of small producing countries in the Caribbean and Central America. In Hawaii and the U.S. mainland, sugarcane production costs were inflated by high land values associated with competition from alternative forms of land use. In Central America, production costs have been boosted by the effects of political unrest, a shortage of seasonal labor, and excess milling capacity as a result of overinvestment in the processing sector.

Beet Sugar Production Costs

LMC identified three main factors affecting a country's ranking in the overall list of sugarbeet production and processing costs:

1. Sucrose yield per unit of area;
2. Wage rates; and
3. The value of land rental.

France performed very well on all three criteria, and so was consistently among the least cost sugarbeet producers. In fact, the production costs of the most efficient beet producers were below the average cost of producing and processing sugarcane. France's sugarbeet production costs actually fell by nearly 20 percent between 1980 and 1982, largely reflecting the depreciation of the French franc against the U.S. dollar and the effect of particularly high yields in the 1982 season.

Most other Western European countries were also well under the 23-cents-per-pound average cost of producing sugarbeets in 1982, mainly as a result of relatively high sugarbeet yields and efficient processing operations. Italy was an exception, having a very low level of factory utilization and estimated costs of 33 cents a pound in 1982, when output was depressed.

The United States and many non-EC sugarbeet producers each recorded costs at or slightly above the 1982 average. Obviously, the relative position of the United States largely reflects the current strength of the U.S. dollar, as its ranking slipped from fourth in 1980 to 14th in 1982. Also, sugarbeet yields and sucrose extraction rates in the United States are not high by Western European standards and high land rentals have resulted from sugar price supports and profitable alternative land uses. The industries of Spain and the Eastern European countries tend to be characterized by relatively low yields of sucrose; high inputs of labor, water, and fertilizer; and small factories.

The Soviet Union has one of the highest production costs even though in some years it is the world's largest single sugar producer. In 1982, the Soviet Union's sugarbeet production and processing costs were estimated at 38.5 cents a pound. In 1981, the estimate was over 46 cents. The main causes for these high production costs are low beet yields and poor sucrose recovery. Given the low wage rates and extensive cultivation methods in the Soviet Union, the Soviets should be able to reduce these costs substantially if they can raise yields.

Japan is also in the highest cost group with 1982 costs of 32 cents a pound. This mainly reflects the very labor-intensive field methods used in Japan, combined with high wage rates. Factory costs in fact are comparable to those of many other countries as a result of a relatively lengthy beet-processing season.

HFCS Production Costs

Despite the strong value of the U.S. dollar, HFCS manufacturing costs in the United States were estimated by LMC at 12 cents a pound in 1982, only slightly higher than the most efficient cane sugar producers and less than any of the beet sugar producers. This low level of HFCS manufacturing cost was mainly due to the availability of low-priced corn and, to a lesser extent, economies associated with large-scale corn wet-milling plants. Argentina and Canada, which also have these characteristics, had similarly low HFCS costs.

The highest cost HFCS producers were Western Europe and Korea, with EC producers being affected by higher corn prices imposed by the Common Agricultural Policy. Japanese costs were midway between the two groups in 1982.

Relationship Between World Production Costs and Sugar Prices

The 4 years of production and processing costs covered by the LMC survey included both high and low phases of the sugar cycle. World sugar "free market" prices, as indicated by the simple annual averages of International Sugar Agreement (ISA) daily prices for 1979-84, are shown in table 10. The extent to which the ISA annual average world prices exceeded (+) or fell short (-) of the production costs estimated by LMC is also summarized in table 10. The analysis is extended to 1983 and 1984 by assuming that costs in those years remained unchanged from 1982. While the analysis is intended to provide some perspective on the relative ability of producers to survive exposure to the sort of price environment experienced in the free market over the 1979-84 period, the analysis is highly simplified and should not be used as an indication of the actual financial situation of producers. In particular, no account is taken of the following:

Table 10—Estimated differences between the ISA world raw sugar price and production and processing costs for cane sugar, beet sugar, and HFCS, by region

Item and region	1979	1980	1981	1982	Estimated	
					1983	1984
Cents per pound 1/						
Raw sugar price:						
World ISA	9.65	28.66	16.89	8.40	8.46	5.21
Production costs:						
Cane sugar						
Major exporters 2/	-4.98 to +0.19 (-4.98 to +0.19)	+5.18 to +18.90 (+1.56 to +18.85)	+0.70 to +5.28 (+2.26 to +24.13)	-6.92 to -2.33 (-3.78 to +20.98)	-6.86 to -2.27 (-10.48 to +18.71)	-10.11 to -5.52 (-20.59 to +13.19)
United States—						
Mainland	-8.32 (-8.32)	+9.13 (+0.81)	-4.37 (-3.56)	-12.91 (-16.47)	-12.85 (-29.32)	-16.10 (-45.42)
Hawaii	-3.98 (-3.98)	+15.20 (+11.22)	+1.72 (+12.94)	-8.36 (+4.58)	-8.30 (-3.72)	-11.55 (-15.27)
Average 3/	-3.99 (-3.99)	+12.76 (+8.77)	+1.15 (+9.92)	-7.41 (+2.51)	-7.35 (-4.84)	-10.60 (-15.44)
Beet sugar:						
Major exporters 4/	-9.27 to -3.27 (-9.27 to -3.27)	+6.18 to +12.70 (-1.99 to +9.43)	-4.72 to +3.69 (-6.71 to +13.12)	-6.82 to -4.47 (-13.23 to +8.65)	-6.76 to -4.41 (-19.69 to +4.24)	-10.01 to -7.66 (-29.40 to -3.42)
United States	-8.20 (-8.20)	+9.38 (+1.18)	-6.22 (-5.04)	-14.84 (-19.88)	-14.78 (-34.66)	-18.03 (-52.69)
Average 5/	-13.16 (-13.16)	+2.29 (-10.87)	-8.03 (-18.90)	-14.91 (-33.81)	-14.85 (-48.66)	-18.10 (-66.76)
HFCS: 6/						
Major producers 7/	-27.48 to -1.22 (-27.48 to -1.22)	-2.55 to +15.04 (-30.03 to +12.89)	-15.23 to +3.04 (-45.26 to +15.93)	-26.53 to -3.48 (-71.79 to +12.45)	-26.47 to -3.42 (-98.26 to +9.03)	-29.72 to -6.67 (-127.98 to +2.36)
United States	-1.61 (-1.61)	+15.75 (+14.14)	+3.01 (+17.15)	-3.84 (+13.31)	-3.78 (+9.53)	-7.03 (+2.50)
Average 8/	-12.10 (-12.10)	+5.23 (-6.87)	-5.32 (-12.19)	-12.65 (-24.84)	-12.59 (-37.43)	-15.84 (-53.27)

() Denotes cumulative profits (+) or losses (-) from year to year.

1/ Current U.S. cents per pound of raw sugar equivalent.

2/ Cuba, Brazil (Central-South), Australia, Dominican Republic, India, Philippines, Thailand, South Africa, and Fiji. Ranges apply to all countries for each year.

3/ Average of 56 sugarcane-producing countries.

4/ France, West Germany, United Kingdom, Netherlands, and Turkey. Ranges apply to all countries for each year.

5/ Average of 26 sugarbeet-producing countries.

6/ Cents per pound, dry weight, of 42-percent HFCS.

7/ Japan, Canada, Argentina, Spain, Belgium, France, West Germany, Italy, Netherlands, United Kingdom, and South Korea. Ranges apply to all countries for each year.

8/ Average of 12 HFCS-producing countries.

Source: Copyright by Landell Mills Commodities Studies Ltd., London, England. 1981 and 1983.

1. Subsidies or price supports, except where these influence production costs;
2. Inflation or interest costs involved in holding financial reserves;
3. Income taxes levied in periods of high income;
4. The cyclical pattern of sugar investment and capital repayments;
5. Production or stocking variations in response to price changes or other factors;
6. Variations in free market transaction prices due to freight, handling differentials, and so forth; and
7. Worsening of the depression in free market sugar prices in the period since 1984.

Subject to these qualifications, the main results from the analysis are as follows. Not one of the cane sugar and beet sugar countries studied has had a "surplus" of price over average costs since 1981, and all but one country also had "deficits" in 1979. The 1984 ISA world price is in fact little more than half the estimated production cost of the most efficient of the major producers, the margin or "deficit" being 5 cents a pound. At the extreme, beet sugar costs in the Soviet Union exceeded the 1984 ISA world price by a margin of 33 cents. U.S. cane sugar and beet sugar production costs were 11.5 and 18 cents a pound more than the 1984 price, respectively.

All of the major cane sugar-producing countries recorded large surpluses of market prices over production costs in 1980, and smaller surpluses in 1981 (the United States being the only exception). In most cases, the 1980 surpluses were in the range of 15-20 cents a pound, and the 1981 surpluses 1-5 cents a pound. Only the most efficient beet sugar-producing countries recorded surpluses even in the high-price year. U.S. HFCS producers fared similarly to cane sugar producers.

Over the 6-year period, the surpluses potentially accumulated by the least cost group of producers in 1980 and 1981 were just sufficient to offset or nearly offset the deficits accumulated in the other 4 years. This group included some major cane sugar exporters, together with U.S. HFCS and the most efficient EC beet sugar producers. All other producers potentially accumulated a substantial deficit by the end of the period: U.S. beet sugar producers to the extent of almost 53 cents a pound and producers in the Soviet Union to the extent of \$1.58 a pound.

NATIONAL SUGAR POLICIES OF MAJOR TRADING COUNTRIES

Farmers will continue to produce cane sugar and beet sugar only while it is profitable for them to do so, but the same does not necessarily apply to governments. In the absence of intervention by governments, economic theory suggests that market prices for sugar would be determined at the level of production costs of the last (highest cost) marginal producer necessary to equate supply to demand. Since 1981, world sugar prices have been well below the production costs of even the most efficient producers, yet output remains at near record levels, well in excess of demand. This reflects two main factors.

First, most major sugar producers and traders receive subsidized prices for their entire output or a large proportion of it. Consequently, they produce more than is needed. In 1983, nearly two-thirds of world sugar production and over half the consumption took place in just 13 nations. These same nations also dominate world sugar trade with over three-fourths of the exports and half of the imports. Each nation intervenes directly in its domestic sweetener market and most regulate both producer and consumer prices (table 11).

Table 11--Policies of major sugar producers and traders, 1983

Country or region	Share of world			Price or production policies	Trade policies
	Production	Consumption	Trade		
	Percent				
Exporters:					
Cuba	7.7	0.8	26.9	Administered prices and production	Government sales
European Community	12.7	11.3	13.4	Producer price guarantees and import regulation	Export subsidies
Brazil	9.9	6.4	11.1	Minimum producer prices and maximum mill price	Sales by quasi-govern- ment corporation
Australia	3.4	0.9	9.5	Fixed domestic prices and production quotas	Sales by quasi-govern- ment corporation
Thailand	3.2	0.6	4.7	Regulated producer, retail, and export prices	Government controlled sales
Philippines	2.2	1.3	4.0	Regulated producer and retail prices	None
Dominican Republic	1.2	0.2	4.0	Government control of production	None
Argentina	1.7	1.1	2.8	Guaranteed minimum farm price, production quotas	Rebate on exports
South Africa	1.7	1.4	1.6	Industry-controlled price stabilization program	Sales by industry
Total	43.7	24.0	78.0		
Importers:					
Soviet Union	9.1	13.9	25.0	Administered producer and consumer prices	Government purchases
United States	5.4	8.7	10.6	Raw sugar price support; import restrictions	Duties, fees, and quotas
Japan	0.9	3.0	8.1	Minimum producer prices; import levies	Import levies
China	4.2	5.9	6.8	Administered prices	Government purchases
Total	19.6	31.5	50.5		

Source: International Sugar Organization, Sugar Year Book, London, England, 1983; World Sugar Journal, and Economic Perspectives, Inc., McLean, Va., 1984.

Second, the remainder--especially cane sugar producers--have already committed a large proportion of the costs necessary for continued production. These costs mainly comprise investments in processing capacity and costs associated with land preparation and crop establishment. Whenever these producers are able to realize a return at least equal to their variable costs of harvesting, processing, and marketing, they will continue production in order to offset at least part of their sunk costs.

In the longer term, if prices do not improve, the nonsubsidized group will eventually have to withdraw from production by not replanting cane, by allowing their equipment to deteriorate, or by switching to alternative activities as declining asset values make these more profitable than sugar production. This adjustment can be painful for those involved. Typical symptoms are mill closures, capital losses, bankruptcies, unemployment, and social problems aggravated by the high degree of dependence on sugar in particular regions and countries. However, to the extent that the initiating market circumstances are beyond the influence of the countries involved, such adjustment is necessary to minimize the impact on economic performance and overall social welfare.

The effect of protectionist national policies is largely to shift adjustment pressures in magnified form to the unprotected sector of the international market. While this also has adverse effects on their own domestic economies through budgetary expenditures and consumption and resource distortions, governments persist in protecting their domestic industries for several reasons: the maintenance of a high level of self-sufficiency for strategic reasons; the wish to maintain a "traditional" agricultural sector for social or environmental reasons; the political will to achieve a particular pattern of income distribution; and the judgment that social costs associated with economic adjustment outweigh the benefits to be obtained from having a more efficient agricultural sector.

National Policies

Major countries with protected high-cost sugar industries can be divided into two main categories.

First, are the developed economies of the EC, the United States, and Japan, where national sweetener policies have contributed to reduced consumption, increased production, and reduced imports, or, in the case of the EC, increased exports. Between 1976 and 1983 these countries' share of world consumption dropped from 31 percent to 23 percent, and their share of world net imports fell from 36 percent to 19 percent, mainly as a result of a halving of U.S. raw sugar imports. Over the same period, the EC switched from being a net importer to the second largest net exporter in the world.

While the national policies of this group were originally designed to protect relatively high-cost domestic producers, their main impact was to encourage production from low-cost sectors. In the EC, price support was aimed at protecting Italian producers, but the main beneficiaries have been efficient French producers, who, the LMC analysis shows, are the only sugarbeet producers with production costs even close to those of the sugarcane exporters. Similarly, sugar support prices in the United States have been associated with expansion in HFCS output. As shown above, U.S. HFCS is competitive in terms of production costs with all but the most efficient of the sugarcane producers.

The second group of countries with protected sugar industries is the Eastern bloc of the Soviet Union, Eastern Europe, and China. The sugar industries of these

countries are among the most highly protected in the world in terms of government assistance necessary to cover the gap between production costs and world prices. This assistance has also been associated with significant increases in domestic production in recent years. However, these increases have been much more than offset by increasing consumption as governments attempt to improve living standards. The result has been that net imports by this group more than doubled between 1976 and 1982, accounting for 36 percent of the world total in the latter year.

The remainder of this section briefly summarizes the specific policies employed in the major sugar-producing and trading nations to protect their sugar industries (12).

Cuba

The present policy of Cuba is to expand its sugar industry and maintain high export production to earn foreign exchange. However, Cuba may have to reduce its sugar production if its major markets, the Soviet Union and China, expand theirs.

All production, distribution, and exports are controlled by the government. Domestic sugar prices are set low. Export prices, except for that small portion sold occasionally in the free market, are controlled by agreement with the Soviet Union and constitute a very large foreign aid component. In exchange for the consumer, industrial, and military goods and services it supplies to Cuba, the Soviet Union accepts Cuban sugar at a set price per pound. For the 1975-77 period, the price was 30 cents a pound for raw sugar. The preferential prices generally exceed the prevailing world price by a large amount.

The European Community

The EC's sugar regime is based on a system of administered prices and production quotas that have resulted in a high-cost industry with high producer and consumer prices and export subsidies that stimulate production and diminish consumption. As a result, the EC has become the largest exporter to the residual free market.

The EC also places a quota on HFCS production. The HFCS program is similar to that for sugar. To date, the EC policies have favored beet sugar production over starch-based sweeteners.

Production quotas (A and B) are defined each year and allocated among producing nations who allocate them among processors. The base quota A is approximately the amount of sugar expected to be consumed in the EC. A supplemental quota B is defined simply as a percentage of the A quota. Production in excess of these quotas is termed C sugar and may not be sold in the EC.

Both A and B quota sugar can be sold to the government for the same price, and both can be exported with the same subsidies. However, B sugar is subject to larger production levies than A sugar. Nonquota C sugar is not eligible for sale to the government, or within the EC, and is not eligible for export subsidies.

Until the last few years, most of the increase in EC production comprised A and B quota sugar. However, these quotas have now been fully taken up, and any further increases in output will have to be in unsubsidized C sugar. Roberts estimated that EC sugar price supports have depressed world raw sugar prices by 7-11 percent (9).

Brazil

In Brazil, more sugarcane is grown to produce fuel alcohol than to produce sugar. Also, there is considerable scope for switching cane between the two end uses as economic circumstances change.

The Brazilian sugar industry operates in an environment that provides a cheap and abundant land resource, cheap labor, generous subsidies to finance new investment, tightly regulated production and marketing programs, and regulated prices that largely insulate producers from world market prices. Ownership of the cane-growing and milling sectors is vested entirely in private enterprise. The production and marketing of both sugar and alcohol are tightly regulated by the Sugar and Alcohol Institute (IAA) which is a part of the Federal Ministry of Industry and Commerce. The IAA each year sets and allocates planting and milling quotas for sugar and alcohol production and, in association with the National Monetary Council, administers fixed domestic prices. It is also the sole exporter and owns all export storage and handling facilities.

Concessional credit for investment in plant modernization and acquisition of additional supply quotas is available at nominal rates, considerably less than the rate of inflation, implying negative real interest rates. If one used these actual (negative) real interest rates to compute capital costs, the production costs would be substantially less than those estimated by LMC. In the efficient central-south region, one of the most cost-competitive of all sugar-producing regions in the world, such a recomputed estimate of total production cost amounts to less than 4 cents a pound. The benefits of such credit to the capital-intensive processing sector appear to be sufficient to completely offset all other factory costs. In effect, processing mills could pay sugarcane growers for the privilege of crushing their cane.

Overall, it is not clear whether Brazil's programs have increased or decreased sugar production over time. Yet, it does seem likely that they have made Brazilian exports more sensitive to changes in the world sugar price and thereby have exerted a stabilizing influence on the world market. The alcohol program, however, has greatly increased the sugarcane production base. Should the program fail or get out of step with cane production, massive additional supplies of sugar could enter the world market (7).

Australia

The Australian and Queensland Governments regulate the sugar industry under policies established in a Sugar Agreement. All sugar produced becomes the property of the Queensland Government, which contracts with CSR Limited (a private firm) to refine and distribute sugar for home consumption and to act as its agent in all export marketing transactions. Revenue from the export and domestic markets are pooled and divided among millers and sugarcane growers according to a fixed-price formula for cane.

Price stability is maintained, as much as possible, in the industry with long-term contracts with importing countries and a fixed domestic wholesale price determined by agreement between the Commonwealth and Queensland Governments. Until recently, the price terms of the long-term contracts worked to Australia's advantage. However, as the contracts come up for renewal they are being renegotiated on the more flexible terms that are much more closely aligned with free market prices.

Overall, Australia is the producer most dependent on the world free market for sales revenue. Over three-quarters of the gross value of Australian sugar production has consistently come from this market in recent years, with the result that producer returns closely reflect changes in world sugar prices.

Philippines

Production, distribution, and trade in the Philippine sugar industry are controlled by the Government. However, sugar lands and mills are privately owned and operated. Sugar production is controlled by the Government through the Sugar Quota Administration (SQA), which utilizes a quota system to allocate the total production established for export, reserve, and domestic needs among the mills. Lands within each quota district are registered with the district mill. In addition, a trade quota system is administered by the SQA that allocates percentages of the export and domestic needs to each mill. Mills and growers are paid according to their production quotas.

Raw sugar prices for export, direct domestic use, and industrial use sugar are controlled by the Government Price Control Council (PCC), subject to Presidential approval. The Government also centralized all sugar trading in late 1972 under a state trading company.

Like Australia, the Philippines depend on the residual "free market" for a sizable proportion of its sales--41 percent of the Philippines' sugar output in 1982.

South Africa

Sugar production is regulated by an agreement with the industry's South African Sugar Association (SASA), which represents equally the growers' and millers' associations. The agreement specifies production quotas, registration procedures, division of proceeds and cane payments, and specifics for an equalization fund to aid small growers and the industry's Price Stabilization Fund. The agreement is implemented by the Sugar Industry Central Branch (SICB), which is self-financed by a levy on the mills.

The SICB allocates grower quotas, which are expressed in short tons of sucrose and applied to specific areas of cane lands in crop or set aside for cultivation. Output for the mills is controlled through this land quota system. The SASA, subject to approval by the Minister of Economic Affairs, determines the maximum industrial sugar quota to be produced by all millers and its conversion into an overall cane quota. Under terms of the agreement, domestic market needs must be filled by the mills before any sugar can be exported. Control of exports is exerted by the Department of Commerce and Industries through permits.

Small growers receive assistance through an industry equalization fund that serves to equalize the export prices for all mills. When returns from sugarcane sales threaten to reduce cane prices below production costs, the Government guarantees loans to the industry.

Retail prices are controlled by the Ministry of Economic Affairs and are nearly double world refined prices. The domestic market price is insulated from the swings in the international market price by an equalizing levy incorporated into the Price Stabilization Fund.

With the exception of a small quantity sold to the United States under quota, virtually all South African sugar exports go to the residual market--36 percent of South Africa's 1982 sugar production.

Argentina

The Government of Argentina has traditionally been protective toward its domestic sugar industry. Price supports are used by the Government to guarantee a fair return to the sugar industry and surcharges are placed on imports to remove any competitive advantages to importing sugar. In addition, exports are taxed, making export production unattractive unless for preferentially priced markets.

The Government annually sets a minimum price for sugarcane and a maximum price for refined sugar. Retail prices are technically free to fluctuate, but are indirectly controlled by the Government through monthly quotas. Imports are duty-free whenever domestic prices threaten to exceed the fixed wholesale price. Production cost studies are used to determine the basic price received by growers.

The Government further assists the sugar industry through development and operation loans and cost sharing.

Dominican Republic

Sugar is the dominant industry in the Dominican Republic and viewed by the Government as a major instrument for earning foreign exchange. The Dominican Sugar Institute, composed of representatives from the Government, producers, and labor, supervises the industry. The Institute allocates the milling quotas for the domestic, U.S., and world markets. The Government Price Stabilization Institute (INESPRE) is responsible for the distribution of sugar between the mills and wholesalers buying for domestic consumption.

Like several other cane sugar exporters, the Dominican Republic relies heavily on finding export markets for its sugar. In 1982, about 61 percent of the sugar production was exported, with 41 percent of the output going to the world free market.

Soviet Union

Sugar production in the Soviet Union is centrally controlled through guaranteed prices, procurement quotas, input and machinery subsidies and supplies, and bonuses for good production. The Government uses price incentives and bonuses to promote farmer cooperation in meeting the production targets. The Government agricultural institutes are also researching production methods and seed varieties to improve sugar yields.

With the entry of Cuba into the Communist bloc in 1960, the Soviets agreed to supply Cuba with capital goods and technical assistance in exchange for sugar at an agreed-upon accounting price, currently well in excess of the world free market price. However, Cuba is not obliged to fulfill its quota and sometimes prefers to sell on the free market where it can earn foreign exchange. Cuba's need for Soviet assistance tends to tie Cuba to the Soviet economy.

United States

The Agriculture and Food Act of 1981 provides price support for domestically grown sugarcane and sugarbeets through the 1985/86 crop year. Support is achieved through purchase and loan programs for cane and beet sugar at specified prices. For raw cane sugar processed between December 22, 1981, and March 31, 1982, a purchase program applied with support at 16.75 cents a pound. A nonrecourse loan program covers sugar produced during the remainder of the period at annually

increasing raw cane sugar loan rates of 17.0, 17.5, 17.75, and 18.0 cents a pound. Beet sugar purchase and loan rates are determined in relation to the support for cane.

The U.S. Government's budget commitment to its sugar price support program is effectively offset by a system of import fees, duties, and quotas. The purpose of the border protection system is to prevent cheaper imports from being substituted for domestic sugar, which would be sold to the Government at the higher support price. The price needed to ensure commercial marketing of sugar, rather than its sale to the Government, is called the market stabilization price (MSP). The MSP includes the raw sugar support rate, freight, handling, interest, and any other transportation costs associated with selling raw sugar, and an incentive to encourage processors to sell in the marketplace. Since enactment of the 1981 legislation, the MSP has been significantly above the world market price. During the same period, quotas have reduced sugar imports by over half, with the balance of domestic sweetener requirements being taken up by domestically produced substitute sweeteners, like HFCS.

Japan

Government control of sugar production in Japan is primarily through the price control activities of the Sugar Price Stabilization Corporation (SPSC), a quasi-government corporation. The SPSC stabilizes market prices by purchasing domestic sugar from manufacturers at prices based on production costs and reselling the sugar to manufacturers at prices reflecting actual market cost. Domestic sugar production is subsidized by the SPSC to make it competitive with the cost of imported sugar. Maximum, target, and minimum prices are set. A flexible import duty is used to minimize fluctuations in international sugar prices below the set maximum price. Consumer price ranges are established annually.

Taiwan

The Taiwan Sugar Corporation (TSC) owns almost the entire Taiwanese sugar industry. However, the corporation functions as a private firm which owns and operates plantations that produce about a third of all sugarcane. The remainder is produced by farmers under contract to the TSC. Farmers are guaranteed minimum prices for their sugar production.

Thailand

The Government of Thailand regulates the wholesale and retail prices of refined sugar to keep the farm price of cane at attractive levels. Pricing mechanisms used to control the price of sugar include a business tax on domestic sugar sales and sugar export premiums. Despite the continued decline in world and farm-gate sugar prices, the Thailand Government has continued its policy of allowing additional milling capacity to be added.

Special Trading Arrangements

Special trading arrangements are also a form of subsidized output. Such arrangements differ from national protectionism in their effect on the residual market in only two respects: they transcend national borders and they provide direct benefits to some of the countries that would otherwise be most affected by the national policies of others. The benefits of special arrangements are conferred by the EC, the Soviet Union, and the United States, whose national policies have probably most affected the free market.

The special arrangements may be viewed as recognition by these countries that their national policies adversely affect other sugar-trading countries with whom they have historical or ideological ties. Unfortunately, the distribution of such largess among recipient countries tends to be very uneven, and its effect is to increase further the adjustments that have to be borne by traders dependent on residual free market sales.

IMPLICATIONS FOR U.S. SUGAR POLICY

The production cost estimates developed by LMC indicate that U.S. production costs are clearly well above both current world prices and the prices at which the major cane sugar exporters can operate profitably. They are also well above the production costs of domestic HFCS producers. This means that the U.S. sugar industry is not in a position to compete in an open domestic sweetener market unless it receives Government assistance on a continuing basis. In the absence of Government assistance, a large number of firms would probably leave the industry, the industry would probably disappear in some regions, and elsewhere would undergo extensive reorganization to enable the remaining units to operate more efficiently.

In a 1976 study, Gemmill estimated that without Government assistance, the U.S. sugar industry would reduce mainland cane production by 34 percent, Hawaiian cane production by 12 percent, Puerto Rican cane production by 8 percent, and mainland beet production by 23 percent (3). The major adjustment in beet production would be in California and the Northwest, while that in cane production would be in Florida. Gemmill contended that only in Florida might the fixity of assets and the lack of suitable alternative crops pose a problem in the short run.

Gemmill's work is now somewhat dated, but the main results likely still apply. Now, as then, the main beneficiaries of opening up the U.S. sweetener market would be domestic users and consumers of sugar and foreign suppliers, especially those for whom U.S. import quotas currently amount to only a small proportion of their exports. Opening up the U.S. sweetener market would probably not impact heavily on the HFCS industry, other than to reduce profits and dampen any tendency for that industry to expand its share of the sweetener market. As indicated by the LMC analysis, HFCS production costs are comparable to those of many cane sugar exporters, so the industry should be able to bear a substantial reduction in prices without the need to reduce operations.

Considering U.S. sugar policy, if assistance continues to be provided to the sugar industry, careful consideration must be given to the form of that assistance. Clearly the existing program has not been efficient in assisting the sugar industry, mainly because lower cost sugar substitutes have benefited even more than sugar producers, thereby greatly increasing the costs of the program and adding unnecessarily to the impact of the program on the international sugar market.

The beneficial effect on the international market of unilaterally opening up the U.S. sugar market would probably not offset the detrimental effect that import quotas have already had over the last few years. As a result of the inroads made by HFCS under the umbrella of sugar price supports, U.S. sugar imports are now less than half their level of the early 1980's. This reduction in imports is equivalent to about 10 percent of the world free market. With sugar's price elasticity of demand in the free market at -0.4, the drop in U.S. sugar imports

would account for an initial fall in the world market price of about 25 percent (3). On this basis, the quotas appear to account for a significant proportion of the recent decline in world prices.

Removing U.S. quotas and other protective mechanisms would not result in a commensurate increase in imports and world free market prices. HFCS production capacity has now been established and HFCS production costs are competitive with those of the efficient sugar producers, especially in the short term when the industry needs only to cover variable costs to remain in operation. Thus, any beneficial effects flowing to the world market from opening up the U.S. sweetener market would have to come largely from adjustments in U.S. sugar production and trade.

Competition with world sugar and domestically produced sugar in the domestic market would force the price of domestically produced sugar down to about the level of the world price plus freight and handling charges to U.S. ports of entry. At this price, U.S. production would compete favorably with production of world sugar, but at a loss to the domestic sugar industry. Even at the levels of sugar price supports legislated in the 1981 Act, nine sugarcane refineries, eight sugarbeet-processing plants, and three sugarcane-processing plants have ceased operations in the United States since 1981.

The protective policies of other countries--notably the EC--not only depress world prices, but increase the degree of protection necessary to maintain the U.S. industry at any particular size and level of prosperity. Thus, one of the policy options available to the United States may be to use its influence to obtain reductions in protectionism. If that is unsuccessful, the United States may choose to engage in a round of retaliatory protection (the "trade war" approach), let its domestic producers bear the consequences of indirect subsidized foreign competition, or take a middle-ground stance and adopt a sugar policy of phased reduction.

While the first course is clearly more acceptable to the short-term specific interests of U.S. sugar producers, it obviously is less acceptable to the interests of U.S. consumers who would otherwise be indirectly subsidized by foreign governments. It also invites further retaliatory action, which would increase the cost of protection to both economies. Perhaps more important, is the fact that the major victims of such measures are likely to be the third country exporters. The political and strategic consequences of this action combined with the adverse effect on U.S. consumers are likely to outweigh any benefits obtained for domestic sugar producers. In the longer term, the general interest of society will be served best through reduced levels of protectionism internationally so that all will realize the gains, derived through trade, of concentrating production in countries with a comparative advantage in sugar production.

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Appendix table 1—World production of centrifugal sugar, by country or region

Country or region	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	Million metric tons, raw value													
	:														
European Community	:	9.1	10.3	9.9	10.2	9.2	10.8	11.2	12.8	13.2	13.6	13.5	15.5	15.7	12.3
Soviet Union	:	8.8	8.4	9.7	9.6	8.5	8.2	6.7	8.9	9.4	7.9	7.2	6.4	7.0	8.8
Other Europe	:	6.5	7.1	7.4	7.2	7.2	7.7	7.9	9.0	8.6	8.6	7.8	9.0	9.5	10.0
Brazil	:	5.0	5.3	6.1	6.9	6.9	6.3	7.2	8.8	7.9	7.4	8.3	8.7	8.9	9.6
Other South America	:	3.9	4.2	4.6	4.9	5.1	5.0	5.4	5.1	5.0	4.7	5.0	5.0	5.2	4.8
India	:	4.6	4.0	3.7	4.0	4.5	5.0	5.0	5.0	7.1	6.1	4.5	6.0	9.1	8.5
China	:	2.9	3.1	3.2	3.3	3.9	4.0	1.8	2.0	2.3	2.8	2.8	3.5	3.7	4.1
Japan	:	0.3	0.4	0.4	0.4	0.4	0.3	0.5	0.6	0.6	0.7	0.8	0.8	0.8	0.9
Philippines	:	2.0	2.2	2.1	2.1	2.7	2.7	3.0	2.6	2.3	2.4	2.3	2.4	2.7	2.1
Thailand	:	0.5	0.6	0.7	0.8	1.0	1.2	1.8	2.4	1.7	2.0	0.8	1.7	3.0	3.1
Other Asia	:	3.3	3.3	3.1	3.2	3.3	3.5	3.4	4.0	3.9	3.6	3.5	3.6	4.2	3.2
Cuba	:	7.6	6.0	4.7	5.4	5.9	6.4	6.2	7.0	7.7	7.8	6.8	7.9	8.0	7.5
Mexico	:	2.4	2.5	2.6	2.8	2.8	2.7	2.7	2.8	3.1	3.1	2.7	2.6	2.7	3.1
Other Central America	:	3.1	3.1	3.0	3.0	3.3	3.6	3.6	3.5	3.4	3.4	3.2	3.2	3.6	3.5
United States 1/	:	5.4	5.3	5.7	5.7	5.4	5.7	6.4	5.8	5.1	5.5	5.3	5.8	5.4	5.2
Other North America	:	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Australia	:	2.5	2.7	2.9	2.6	2.9	2.9	3.4	3.5	3.0	3.0	3.4	3.5	3.7	3.3
Other Oceania	:	0.3	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.4	0.3
Africa	:	4.6	4.9	5.4	5.3	5.4	5.2	5.7	6.1	6.1	6.2	6.0	6.4	7.0	6.4
	:														
World total	:	72.9	73.9	75.7	77.8	78.9	81.6	82.4	90.3	90.8	89.3	84.5	92.6	100.7	96.8

1/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Appendix table 2—World consumption of centrifugal sugar, by country or region

Country or region	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	Million metric tons, raw value													
European Community	:	10.7	10.5	10.5	11.1	11.7	9.5	11.0	10.2	10.9	10.8	11.0	10.6	10.6	10.5
Soviet Union	:	10.2	10.4	10.8	11.2	11.3	11.3	11.6	11.9	12.1	12.2	12.3	12.5	12.7	12.9
Other Europe	:	8.2	8.4	8.7	9.2	9.1	9.1	9.1	9.5	9.6	9.9	9.5	9.5	10.0	10.0
Brazil	:	3.5	3.8	4.1	4.3	4.6	5.0	5.1	5.1	5.3	6.0	6.3	5.9	6.1	5.9
Other South America	:	3.1	3.4	3.5	3.5	3.8	3.9	3.9	4.0	4.1	4.3	4.4	4.4	4.3	4.3
India	:	3.8	4.4	3.9	3.8	3.8	3.9	4.0	4.2	5.2	6.7	5.0	5.4	6.7	7.2
China	:	3.2	3.3	3.6	3.8	4.2	4.2	2.2	3.2	3.7	3.7	3.6	4.3	5.0	5.5
Japan	:	3.0	3.1	3.2	3.3	3.3	2.8	3.2	3.3	2.9	3.2	3.0	2.7	3.1	2.8
Philippines	:	0.6	0.7	0.7	0.8	0.9	0.9	0.8	1.0	1.1	1.2	1.2	1.1	1.1	1.2
Thailand	:	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Other Asia	:	5.3	5.6	5.8	5.7	5.7	5.6	5.9	6.8	7.7	8.0	7.9	8.2	8.3	8.7
Cuba	:	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7
Mexico	:	2.0	1.9	2.1	2.3	2.3	2.5	2.7	2.7	2.9	3.1	3.2	3.3	3.5	3.2
Other Central America	:	0.9	1.0	0.8	0.9	1.1	1.1	1.1	1.2	1.3	1.2	1.3	1.3	1.4	1.4
United States 1/	:	10.4	10.4	10.6	10.6	10.3	9.1	10.0	10.4	10.0	9.9	9.3	9.0	8.5	8.1
Other North America	:	1.1	1.0	1.1	1.2	1.0	1.1	1.0	1.1	1.1	1.1	1.0	0.9	0.9	1.0
Australia	:	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Other Oceania	:	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Africa	:	4.1	4.5	4.6	4.9	5.0	5.1	5.5	5.9	6.2	6.6	7.1	7.5	7.5	7.6
	:														
World total	:	72.1	74.4	75.8	78.5	80.1	77.1	79.2	82.6	86.2	90.0	88.2	88.8	91.9	92.6

1/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Appendix table 3—World net exports of centrifugal sugar, by country or region

Country or region	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	:	Million metric tons, raw value													
European Community	:	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	1.0	1.9	2.1	2.9	4.0	4.2	3.4
Soviet Union	:	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other Europe	:	0.5	0.2	0.6	0.5	0.2	0.3	0.5	0.4	0.6	0.4	0.6	0.2	0.4	0.7
Brazil	:	1.1	1.2	2.6	3.0	2.3	1.7	1.3	2.5	1.9	1.9	2.7	2.7	2.8	2.8
Other South America	:	1.1	1.2	1.5	1.4	1.7	1.3	1.1	1.7	1.2	1.3	1.2	1.2	1.0	1.3
India	:	0.3	0.4	0.1	0.2	0.5	1.0	0.9	0.3	0.7	0.7	N.I.	N.I.	0.5	0.8
China	:	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Japan	:	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Philippines	:	1.2	1.4	1.3	1.5	1.6	1.0	1.5	2.6	1.1	1.2	1.8	1.3	1.3	1.0
Thailand	:	1/	0.1	0.4	0.3	0.6	0.7	1.1	1.7	1.0	1.2	0.4	1.2	2.0	1.2
Other Asia	:	0.6	0.6	0.5	0.4	0.6	0.4	0.6	0.5	0.5	0.4	0.4	0.2	0.4	0.4
Cuba	:	6.9	5.5	4.1	4.8	5.5	5.7	5.8	6.2	7.2	7.3	6.2	7.1	7.6	6.8
Mexico	:	0.6	0.6	0.6	0.6	0.5	0.2	1/	0.0	1/	1/	N.I.	N.I.	N.I.	N.I.
Other Central America	:	1.8	2.1	2.4	2.2	2.2	2.2	2.3	2.5	2.2	2.3	1.8	1.8	1.9	2.2
United States 2/	:	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other North America	:	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Australia	:	1.7	1.8	2.3	2.1	1.8	2.0	2.6	3.0	2.0	2.0	2.4	3.0	2.5	2.4
Other Oceania	:	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
Africa	:	2.0	2.0	2.3	2.2	2.1	1.7	2.0	2.7	1.8	2.2	2.3	2.0	2.3	1.9
	:														
World total	:	18.1	17.4	19.0	19.5	19.9	18.4	20.0	25.4	22.4	23.4	23.1	25.1	27.3	25.3

N.I. denotes net importer.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Appendix table 4—World net exports of centrifugal sugar to the free market, by country or region

Country or region	: 1970	: 1971	: 1972	: 1973	: 1974	: 1975	: 1976	: 1977	: 1978	: 1979	: 1980	: 1981	: 1982	: 1983
	Million metric tons, raw value													
European Community	: 0.1	0.1	0.8	0.8	0.1	N.I.	1.2	2.4	3.3	3.4	4.2	5.3	5.5	4.8
Soviet Union	: 1.1	1.1	N.I.	N.I.	0.1	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other Europe	: 1.1	0.6	0.9	0.9	0.7	0.4	0.6	0.5	0.9	0.6	0.9	0.4	0.7	1.1
Brazil	: 1.1	1.1	2.6	3.0	2.3	1.7	1.3	2.5	1.9	1.9	2.7	2.7	2.8	2.8
Other South America	: 0.9	1.0	1.3	1.2	1.5	1.1	0.9	1.5	1.0	1.2	1.0	1.0	0.8	1.2
India	: 0.3	0.3	0.1	0.2	0.5	1.0	0.9	0.2	0.7	0.7	N.I.	N.I.	0.5	0.8
China	: 1/	0.1	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Japan	: N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Philippines	: 1.2	1.4	1.3	1.5	1.6	1.0	1.5	2.6	1.1	1.2	1.8	1.3	1.3	1.0
Thailand	: 1/	0.1	0.4	0.3	0.6	0.7	1.1	1.7	1.0	1.2	0.4	1.2	2.0	1.2
Other Asia	: 0.6	0.7	0.5	0.4	0.5	0.4	0.6	0.6	0.4	0.4	0.4	0.2	0.4	0.4
Cuba	: 2.1	2.2	1.8	1.8	2.2	1.7	1.4	1.5	2.1	2.1	2.2	2.2	1.7	1.7
Mexico	: 0.6	0.6	0.6	0.6	0.5	0.2	1/	0.0	1/	1/	N.I.	N.I.	N.I.	N.I.
Other Central America	: 1.5	1.7	2.0	1.8	1.9	1.8	2.0	2.1	1.8	2.0	1.6	1.6	1.6	1.9
United States 2/	: N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Other North America	: N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.	N.I.
Australia	: 1.7	1.8	2.3	2.1	1.8	2.0	2.6	3.0	2.0	2.0	2.4	3.0	2.5	2.4
Other Oceania	: 0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.3	0.2	0.3	0.2
Africa	: 1.4	1.4	1.8	1.7	1.6	1.1	1.3	2.0	1.2	1.4	1.5	1.4	1.5	1.0
World total	: 13.9	14.4	16.6	16.5	16.1	13.2	15.5	20.7	17.5	18.3	19.4	20.5	21.6	20.5

N.I. denotes net importer.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Appendix table 5—World net imports of centrifugal sugar, by country or region

Country or region	: 1970	: 1971	: 1972	: 1973	: 1974	: 1975	: 1976	: 1977	: 1978	: 1979	: 1980	: 1981	: 1982	: 1983
	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Million metric tons, raw value													
European Community	: 1.0	: 1.0	: 0.4	: 0.3	: 1.0	: 1.4	: 0.2	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.
Soviet Union	: 1.5	: 0.1	: 1.9	: 2.6	: 1.7	: 3.2	: 3.7	: 4.7	: 3.8	: 3.8	: 4.8	: 5.0	: 7.1	: 5.9
Other Europe	: 1.9	: 2.1	: 1.9	: 2.1	: 2.4	: 2.0	: 2.0	: 1.7	: 1.3	: 1.5	: 1.5	: 1.9	: 1.4	: 1.6
Brazil	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.
Other South America	: 0.1	: 0.2	: 0.3	: 0.3	: 0.2	: 0.2	: 0.2	: 0.6	: 0.6	: 0.6	: 0.7	: 0.8	: 0.8	: 0.7
India	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: 0.1	: 0.1	: N.E.	: N.E.
China	: 0.4	: 0.3	: 0.6	: 0.6	: 0.4	: 0.2	: 0.5	: 1.5	: 1.3	: 0.9	: 0.7	: 1.0	: 2.4	: 1.6
Japan	: 2.5	: 2.4	: 2.7	: 2.4	: 2.8	: 2.4	: 2.5	: 2.8	: 2.4	: 2.7	: 2.3	: 1.6	: 2.2	: 1.9
Philippines	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.
Thailand	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.
Other Asia	: 2.8	: 3.1	: 2.7	: 3.5	: 2.9	: 3.1	: 2.7	: 3.9	: 4.4	: 4.8	: 4.9	: 5.1	: 5.2	: 4.3
Cuba	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.
Mexico	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: 0.8	: 0.7	: 0.5	: 0.8
Other Central America	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 1/	: 0.1	: 0.1
United States 2/	: 4.8	: 5.1	: 5.0	: 4.8	: 5.2	: 3.3	: 4.2	: 5.3	: 4.2	: 4.4	: 3.2	: 3.7	: 2.3	: 2.5
Other North America	: 1.0	: 0.9	: 1.0	: 1.0	: 0.9	: 1.0	: 0.9	: 1.0	: 1.0	: 1.0	: 0.9	: 0.8	: 0.8	: 0.9
Australia	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.	: N.E.
Other Oceania	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2	: 0.2
Africa	: 1.5	: 1.6	: 1.7	: 1.7	: 1.8	: 1.6	: 1.9	: 2.2	: 2.9	: 2.6	: 3.0	: 3.3	: 3.3	: 3.1
World total	: 17.7	: 17.0	: 18.4	: 19.5	: 19.5	: 18.6	: 19.0	: 23.9	: 22.1	: 22.5	: 23.1	: 24.2	: 26.3	: 23.6

N.E. denotes net exporter.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London, England. 1975, 1978, 1982, and 1983.

Appendix table 6--World net imports of centrifugal sugar from the free market, by country or region

Country or region	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	Million metric tons, raw value													
European Community	:	N.E.	N.E.	N.E.	N.E.	N.E.	0.2	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Soviet Union	:	N.E.	N.E.	0.8	1.0	N.E.	0.2	0.6	1.1	0.1	0.2	2.2	2.0	2.9	2.9
Other Europe	:	1.1	1.2	1.5	1.7	1.9	1.6	1.4	1.2	0.9	1.0	1.1	1.1	1.0	1.0
Brazil	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other South America	:	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.6	0.6	0.6	0.7	0.8	0.7	0.7
India	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	0.2	0.1	N.E.	N.E.
China	:	N.E.	N.E.	0.3	0.3	1/	1/	0.2	1.3	0.8	0.4	0.2	0.5	1.8	0.9
Japan	:	2.5	2.4	2.7	2.4	2.8	2.4	2.5	2.8	2.4	2.7	2.3	1.6	2.2	1.9
Philippines	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Thailand	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other Asia	:	2.5	2.8	2.6	3.2	2.7	2.9	2.6	3.7	4.2	4.6	4.7	4.9	5.0	4.1
Cuba	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Mexico	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	0.7	0.7	0.5	0.8
Other Central America	:	1/	1/	1/	1/	1/	1/	1/	1/	1/	1/	0.1	0.1	0.1	0.2
United States 2/	:	4.7	5.0	4.9	4.8	5.2	3.3	4.2	5.3	4.2	4.4	3.2	3.7	2.3	2.5
Other North America	:	1.0	0.9	1.0	1.0	0.9	1.0	0.9	1.0	1.0	1.0	0.9	0.8	0.8	0.9
Australia	:	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.	N.E.
Other Oceania	:	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Africa	:	1.5	1.6	1.7	1.7	1.8	1.6	1.9	2.2	2.9	2.6	3.0	3.3	3.3	3.1
World total	:	13.6	14.3	16.0	16.6	15.7	13.6	14.7	19.4	17.3	17.7	19.5	19.8	20.8	19.2

N.E. denotes net exporter.

1/ Less than 100,000 metric tons, raw value.

2/ Includes Hawaii.

Source: International Sugar Organization, Sugar Year Book. London England. 1975, 1978, 1982, and 1983.

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